

ADVISORY NOTE 38

ASFP position on use of Critical Temperatures within 6th Edition of the Yellow Book

The ASFP Yellow Book *"Fire Protection for Structural Steel in Buildings"* has provided guidance on the testing, assessment, design and specification of structural steel passive fire protection, ever since the first version was published in 1977.

The content and the text within the Yellow Book have been updated over the years since, reflecting developments and changes in testing standards, structural steel design codes, construction product regulations and the regulatory environment for building management. One of the most important pieces of information contained within the Yellow Book is data on recommended default Critical Steel Temperature for different structural steel configurations (e.g. beams and columns or I section / hollow section). These are the recommended critical temperatures that can be used in the absence of a detailed structural calculation to determine the actual critical temperature of a given structural section.

At the start of 2025, ASFP published the 6th Edition of the Yellow book, making several important changes from the previous 5th Edition.

Structural steel design codes have been evolving through time. Earlier versions of the Yellow Book used BS5950 as the main source code for structural design. The 5th Edition of the Yellow Book contained amendments that were needed to keep pace with steel design practices such as adoption of the Steel Eurocodes and use of Multi-Temperature Analysis (MTA) and Structural Fire Engineering.

Using Eurocode for steel design allows for a fire engineering approach which can be used to calculate the critical temperature of structural steel members. However, the practice of carrying out such a structural analysis is not common in the UK market. The UK construction industry has traditionally worked with a series of default temperatures. As part of the 5th Edition update, in 2014, the ASFP introduced 3 new tables of default temperatures in the Yellow Book, covering both the historical BS5950 and newer Eurocode design scenarios. These tables were accompanied by a flow chart to help specifiers chose the correct table.

We became aware that these tables and flow chart were considered over complicated, and the underpinning assumptions were not clear. As a result, we reviewed both the tables and flow chart and provided a justification text in ASFP Advisory Note 24. However, this did not resolve the complexity of the situation.

We also became aware that the critical temperatures in Advisory Note 24 and Yellow Book 5th Edition did not match the recommendation within the UK's National Annex to the Eurocode (BS EN 1993-1-2:2024).

The ASFP was planning to review the contents of the Yellow Book to separate out the texts for different users of the guidance by breaking it up into three distinct volumes relevant to specific audiences such that:

- Volume 1: Aimed at designers, specifiers, and installers of structural steel fire protection, focuses on best practices in system design and material specification
- Volume 2: Dedicated to the testing and assessment of intumescent coatings
- Volume 3: Covers the testing and assessment of other passive fire protection materials and systems, such as boards, batts, mortars, and sprays.

Significant changes introduced in the newly released Yellow Book 6th Edition Volume 1 include:

- **Simplified default critical temperatures:** In response to industry feedback, the 6th Edition introduces a simplified default critical temperature table, replacing the complex tables from the 5th Edition. The revised table aligns with the UK National Annex of BS EN 1993-1-2:2005 Eurocode 3, providing a streamlined approach to structural fire design. Temperatures are now lower than the traditional 550°C / 620°C referenced in earlier editions, reflecting modern design advice and enhancing clarity for users. The table below contains the new revised critical temperatures.

Simple Description	Structural Use / Longer Description	Critical Temp (°C)
3-sided Beam	I section and Hollow section beams in bending supporting concrete slabs or composite slabs.	580
4-sided Beam	I section and hollow section beams in bending not supporting concrete slabs	550
Hangers and Tension Braces	Members in tension only of any shape	550
Columns of any shape	Compression members of any shape (including Hollow Columns, trusses and other bracings)	500

It should be noted that the above temperatures are based on the provisions of the UK's national annex in BS EN 1993-1:2024. These provisions may not be relevant in other counties (e.g. where different structural design provisions exist).

- **New approach for cellular beams:** The 6th Edition adopts a revised method for calculating protection thicknesses for beams with web openings (cellbeams). This includes using 500°C as the default critical temperature in the absence of a specified value, ensuring consistency with the latest structural design practices.

Only minor editorial amendments have been made to the assessment methodologies between the 5th Edition and new 6th edition aimed at clarifying the text. It is not imagined that products assessed to the 5th edition rules need to be re-assessed to the 6th edition. A sunset date for products assessed to the 5th edition of the Yellow Book is not, therefore required.

The guidance contained within Volume 1 of the Yellow Book 6th edition came into effect, when the document was published in January 2025. The critical temperature advice contained should be recognised as best practice based upon the UK National Annex to BS EN 1993-1-2:2024. However, if the design of the structural steel frame has been done following a different design code (or in line with different regulatory requirements), then it may not be appropriate to use these temperatures. In these cases, advice from a structural engineer should be sought.

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